How Are Technology Education Teachers Learning To Maintain Technology Shop Equipment?

By

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ABSTRACT

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The purpose of this article is to explore the question of why are technology education teachers not being taught how to maintain shop equipment? To answer this the design and use of a survey questionnaire was planned and implemented. Technology education teachers were asked a number of questions to determine how technology education teachers are being trained, to maintain the wide variety of equipment found in technology education laboratories. The

questionnaires were used to statistically show that teachers feel that it is important to be well educated in maintenance and the importance of universities to provide training in equipment maintenance. Maintaining equipment could include, but not limited to adjusting saws, lubricating equipment, changing saw blades, jointer knives, making jigs and fixtures, setting up welding equipment and automotive equipment. Survey responses showed, the need for curricular changes at the university level, to offer courses designed to provide maintenance training.

The article has five parts. To supply context for the survey questionnaire, chapter one discusses background for the study, statement of the problem, research purpose and research questions. Chapter two focuses on the history and philosophies of technology education. Reasons are revealed for the absence of maintenance courses, and the decrease in the number of lab courses or skills training courses, being taught at the University of Wisconsin-Stout, St. Cloud State University, Vitter University, and University of Wisconsin-Platteville. The third and fourth parts of the article discuss survey method, instrumentation of the survey procedure, statistical method, and data analysis. Statistical tables are presented and are explained. This information presents proof for the inclusion of courses designed to provide technology education maintenance.

Chapter five discusses tentative recommendations for universities to offer courses in equipment maintenance. Topics could include modular equipment maintenance, robotics maintenance, fixtures and jig construction. These courses would need to be set up to give students the opportunity to operate and maintain the equipment found in many school technology education laboratories.

Acknowledgment

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August, 2003 Dave Shanklin

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Chapter I

Background of Study

Technology has been taught in middle school and high schools for years. Even with the change of Industrial Arts to Technology Education students were taught by technology education teachers to make projects that vary from making cabinets, cutting boards, and furniture, to making CO2 cars, airplanes and high mileage vehicles. The equipment used in technology education laboratories can vary from jointers, planners, and shapers to robots, computers, lasers and the technology education module. How have teachers been trained to maintain the wide variety of equipment found in technology education laboratories?

The focus of this paper was to determine if universities that are teaching Technology Education, such as the University of Wisconsin-Stout, University of Wisconsin-Platteville, Viterbo University, St. Cloud State University and Bemidji State University were offering courses intended to teach technology education teachers how to maintain the wide variety of equipment found in high school technology education laboratories.

Survey questions, asked technology education teachers how they have been trained to maintain the wide variety of equipment found in their laboratories. Teachers were asked if they feel that it is important for universities to provide technology education laboratory maintenance courses; also if they felt that it is important to take more than five shop classes, in order to help them have the skills experience to teach classes such as Woods, Metals, Automotive and Graphic Communications. A survey question asked teachers to rate their confidence level of maintenance ability.

During University of Wisconsin-Stouts, Manual Arts and Industrial Arts periods, technical education students were given the opportunity to take courses that would allow them the experiences needed to safely operate and maintain equipment found in technology education laboratories. As the years past, the name and philosophies of technical education changed. Courses changed from Woods, Automotive, Metals and Graphic Arts, to Construction, Transportation, Manufacturing, and Communications.

Technology education teachers, who teach in many school districts through out Wisconsin, were required to maintain the equipment found in their laboratories. As a concern with teacher liabilities, should universities be providing courses designed to help them maintain technology education equipment?

Statement of the Problem

Many college students that enroll in technology education do not possess the experience needed to maintain the wide variety of equipment found in our middle school and high school technology education laboratories. Universities such as: University of Wisconsin-Stout, University of Wisconsin-Platteville, St. Cloud State University, Bemidji State University and Viterbo University, do not provide courses that are designed to teach students how to maintain technical education equipment. As the name for the profession changed from Manual Training to Industrial arts to Technology Education, the way of teaching students technology education started to shift in the 1980's from skills type training to general knowledge of processes and the importance of technology in our society Hofer (2003). Technology education is taught differently at every school district in Wisconsin. Some school districts want teachers to teach the traditional Industrial Arts way and others prefer the modular teaching style. Technology education teachers needed to be confident in the operation and maintenance off all types

of equipment found in technology education laboratories. Are teachers confident about their maintenance ability, and if they are not confident what can be done about it?

Research Purpose

The purpose of this study is to determine if technical education teachers feel it is necessary for universities to make curricular changes to include courses designed to train students, in technology education equipment maintenance. With the use of a survey, technical education teachers will provide information on how they have been trained to maintain technical education equipment. This study sought to answer the following research questions:

Research Questions

- Do technology education teachers feel it is important for universities to provide courses in technology education shop maintenance?
- Do technology education teachers feel it is important to take more than five laboratory courses to graduate in technology education? These laboratory courses are designed to teach students the hands on skills needed to operate and maintain equipment.
- Do technology education teachers feel it is important to be well educated in equipment maintenance?
- Are technology education teachers maintaining equipment by trial and error?

To answer these questions, the following null hypotheses were drawn:

1. There is no significant difference among opinions of teachers with less than five years teaching experience and teachers with over five years teaching experience, requiring universities to provide training in technology education shop maintenance.

2. There is no significant difference on confidence ability of teachers with less than five years teaching experience and those with over five years of teaching experience.

3. There is no significant difference between teachers who have less than five years teaching experience and those teachers with more than five years teaching experience, taking a maintenance course that was offered at a university.

4. There is no significant difference between teachers with less than five years teaching experience and those teachers with more than five years experience, being required to maintain technology education equipment.

5. There is no significant difference between teachers with less than five years teaching experience and teachers who have more than five years teaching experience, having to maintain equipment by trial and error.

6. There is no significant difference between teachers with less than five years teaching experience and teachers with more than five years teaching experience requiring university students to take more than five laboratory or skills based classes as part of there teacher preparation.

Significance of the Study

The importance of being well educated on maintenance is evident when school districts such as Cudahy, Hartford, Madison, and many others in Wisconsin, are requiring teachers even by trial and error to maintain the equipment found in their technology education labs. If a teacher makes a mistake maintaining equipment and a student gets hurt because of it, the teacher could be held liable.

One person would not take the survey because he was in litigation against another teacher because of a maintenance error. Universities should be aware that technology education teachers could be held responsible for maintenance mistakes, even if they were never properly trained to maintain the wide variety of equipment found in technology education laboratories through out Wisconsin's school districts.

This study will concentrate on answering the next five questions

1. How are technology education teachers being taught to maintain shop class equipment?
2. Do technology education teachers feel that it should be recommended to universities that they provide training to teachers on shop class maintenance?
3. Are their technology education teachers maintaining equipment by trial and error?
4. Do all teachers feel confident maintaining technology equipment?

The importance of being well educated on maintenance is evident when school districts are requiring teachers to maintain equipment in their technology education labs. Statistical results from the survey will show that technical education teachers, who have not taken a maintenance course at a university, feel that it is important to take more than five shop classes so they will be familiar with equipment used in the lab.

Setting of the Study

Technical education teachers attending the WTEA (Wisconsin Technical Education Association) convention April 3, 2003, will be asked to take a survey questionnaire given by Dave Shanklin. Two hundred and thirty technology education teachers assembled at the convention this year. Seventy randomly selected teachers were asked to fill out a survey questionnaire. The statistical results of the survey will be with a ninety-five percent confidence rate generalized to the population of one thousand two hundred and fifteen, technical education teachers in the state of Wisconsin. The sample of seventy randomly selected technical education teachers will be sufficient to eliminate population bias.

Research Objectives

1. To determine if technology education teachers feel it is important to be well educated in equipment maintenance.
2. To determine how technical education teachers are being trained to maintain technology education shop equipment.
3. To determine if technology education teachers feel universities need curricular changes to include classes in technology education shop maintenance.

4. To determine if technology education teachers feel it should be necessary to take at least five technology education laboratory classes to graduate in technology education.

5. To identify recommendations.

Limitations

The following limitations of this study were observed

- Teachers were given the survey, and asked to return it to a table. Not all teachers returned a completed survey. General limitations, assuming an adequate response rate of eighty percent are needed. The results can be generalized to the population of one thousand two hundred and fifteen Wisconsin technology education teachers. Sixty of the seventy surveys were returned giving an 85% return rate.
- Teachers needed to be at the WTEA convention in Wisconsin Dells, April 3, 2003, to be included in this study.
- The survey did not test teacher's aptitude as it relates to maintenance problems.
- This survey does not test teacher's maintenance performance.

Assumptions

1. The study will show that Wisconsin technology education teachers are learning to maintain shop equipment by trial and error and on the job experiences.

2. The study will also show that as of August 2003, universities are not training students in technology education shop maintenance. The teachers, who graduated during the Manual Training and Industrial Arts period, have a much greater chance of having taken a maintenance course as part of their university training.

3. The study will show teachers feel that it should be recommended to universities or technical colleges to provide teachers courses in technology education maintenance training.

4. The study will show an aging white male population of technical education teachers.

5. The study will show that the highest percentages of teachers are UW-Stout graduates.

Definition of Terms

Maintenance is defined as: Changing blades, lubricating, adjusting, setting up equipment, replacing broken bits, replacing planner knives, jointer knives, making jigs and fixtures.

Shop class, is defined as: A lab that is equipped with traditional and non-traditional equipment such as woodworking, metalworking, automotive equipment, computers, robots, lasers, and much more.

Manual Arts, is defined as: The Manual Arts began during the beginning of the 20th century when the philosophies of the profession encouraged the hands on approach to learning.

Industrial Arts is defined as: The technology education period of the 1950's-1980. Industrial Arts encouraged the hands on approach to teaching skills.

Technical Education is defined as: The name Technology Education started to appear in the 1980's, the philosophy of the profession is: we should be teaching technology

education to the entire population and the material is to be knowledge based not skills in nature.

Vocational Education is defined as: Teachers education program in trades and industries. This program is designed to prepare a person to teach a trade type occupation.

Skilled Based Teaching is defined as: the teaching style of the Manual Arts and Industrial Arts periods. The technology education teacher taught learning by doing, making projects with the use of equipment.

Knowledge Based Teaching, is defined as: General knowledge about technology education, not vocational in nature, and the significance of industry in our society.

Chapter II

Review of Literature

Evolution of Technology Education

The instruction of technology began when early man taught his sons to master skills needed for survival. Early humans appreciated and respected the place and value of hand skills in their culture. These skills were the technology of their time. The laws of the group and their religious teachings required that every young man be taught hand skills Phillips (1985). James H. Stout started the University of Wisconsin-Stout or the Stout Institute in 1893. A Menomonie industrialist and a man of great vision, James saw that students in America's developing industrial society needed a different kind of education, an education broader than that offered by the traditional curriculum. Since it's founding, Stout, has gained a position of national leadership in Industrial, Vocational, and Home Economics education.

Students enrolled in technology education during the Manual Arts period of 1909, were required to take a course intended to teach them about equipment maintenance. The course name was Manual Training Equipment. The aim of this course was to enable students to solve some of the problems that must be considered in planning, equipping, and maintaining a manual training room or building in an efficient and economical manner under a special set of conditions.

Topics to be covered in this course included

1. Fitting up a woodworking shop.

2. Arranging benches and machines in various shops.
3. Design and build a tool closet, lumber closet, joinery bench with drawers, and a tool rack L.D. Harvey (1909).

In 1940, Earnest H. Hintz looked at the number of school shops in the United States. By looking at (Appendix A) you can predict what kind of equipment was going to be in an Industrial Arts laboratory. Most schools were teaching Woods, Drafting, and Metal Works. Mr. Hintz‘s paper talked about fitting up a wood shop and principals of shop planning.

Philosophy of Technical Education

The University of Wisconsin Stout’s philosophy of technical education was skills orientated. Students were required to take courses that taught them how to use tools of industry; these tools included jointers, saws, planers, electronic simulators and metals equipment. Students made projects and used their knowledge after graduating to teach middle and high school students how to use tools in order to make their projects.

There has been a discrepancy in the naming philosophies and ways of teaching students technology education. Some philosophers felt it was necessary to teach students skills and others felt it was necessary to teach students about processes and industry while eliminating skills. Philosophers included Rousseau, Practical Education, and Pestalozzi of the Manual Arts, to the Sloyd, Swedish National Developments (Amish) Vocational Education and Dewy Richards, Industrial Arts, to the Smith-Hughes Act of Vocational Technical Education. All these philosophers believed in teaching skills to help students become carpenters, blacksmiths and cabinetmakers.

In the 1980’s the field started to change from Industrial Arts to Technology Education. During the Industrial Art periods of the1920’s to the1980’s courses were

offered at the University of Wisconsin Stout. These classes were intended to teach students to maintain woodworking, metal working, automotive and graphic arts equipment. A 1982 University of Wisconsin-Stout course bulletin offered students many classes in machinery, some included:

1. **130-592 Mechanics of Machinery I**

   The study of dynamics as applied to machinery including: rectangular and curvilinear motion, translation and rotation of a rigid body, force acceleration equation, impulse and momentum: work, power energy, balancing and vibration.

2. **130-593 Mechanics of Machinery II**

   The study of graphical and analytical analysis and synthesis of linkages, cams, and gear trains including: displacement, velocity, acceleration, and dynamic force.

3. **130-433 Tool and Die Design**

   The study of the design and applications for jigs and fixtures for lathes and mills. The study of milling cutters, lathe tools, boring bars, and gauges for checking work.

Hofer (2003) taught a woodworking maintenance course, Tool and Machine Conditioning. This course was developed and taught by Dr. Robert Swanson the course was intended to teach students how to operate and maintain woodworking equipment. The student was given instruction on how to change blades, knives and bearings. Other maintenance courses were offered in the areas of Metals, Graphic Arts, and Automotives.

Current Technical Education Philosophy

Maintenance courses started to be dropped from the curriculum in 1983. Welty (2003), teachers were required to start taking courses such as Mainstreaming, and Multiculturalism to make way for these new courses other courses needed to be eliminated, courses such as Tool and Machine Conditioning were found to be

unimportant in teacher preparation. With the addition of new classes, technology education teachers' class selections needed to be changed and revised. The university provided maintenance training before the 1980's because the equipment found in technology education classes was predictable. You would find a table saw, jointer, planer in the woods lab, a mill, and break in the metals lab and some diagnostic equipment in the automotive lab. The trend was to get away from Woods, Metals, Automotive and Graphic Arts; and introduce new classes in Manufacturing, Construction, Transportation and Communications. The equipment found in these new labs might include the traditional woods, metals and graphic arts and communication equipment but it could also include modular technology, robots or CNC machines. The need for classes to include experiences in the operation and maintenance of a wide variety of equipment is needed for technology education teacher preparation.

As the push for technology education to be offered to every student continued into the 1990's, the switch from skills based learning lead to general knowledge of industry and how it affects society. Savage and Sterry proposed a conceptual framework for technology education(Sanders) 2001. A structure for a curriculum grounded in the processes of technology rather than industry. There by consummating a divorce from Industrial Arts in the eye of the profession. During this period University of Wisconsin-Stout has decreased the requirements of skills or vocational training from the 1980's until 2003.

Thirty to forty skills based laboratory courses such as Plastics, Woodworking 1 and Woodworking 2, Metals, and Automotive Mechanics have been dropped from the curriculum, Johnson (2003). Courses that taught Woods, Metals and Plastics have been crunched together as Materials Processes Hofer (2003) which is taught out of a textbook with no hands or skills experiences. Course names have been changed from Woods,

Metals, Plastics, Automotive, and Graphic Communications to Manufacturing, Construction, Transportation, and Communications.

After twenty years the absence of meaningful dialogue within the profession regarding the relationship between technology education and vocational education has led to confusion within and beyond the field. Technology education teachers are working in laboratories that have computers to solve problems, control equipment, and communicate Cummings (1987). The table saw will be found in a materials processing area along with hot metals, plastics and material testing.

Future

In the future the technology education equipment list will include the traditional Woods, Metals, and Automotive equipment but more emphasis will be placed on Electronics, Communications, Lasers, Fiber Optics, and Robotics. School districts such as Trempealeau, Madison Metropolitan, Hartford, and others are looking for teachers who are qualified in all areas of technology education. By looking at (Appendix C,D,E) of the Wisconsin Department of Public Instruction, we can see that school districts are counting on teachers being knowledgeable in all areas of technology education.

Through research teachers who are graduating in 2003, are not being offered all the courses needed to help them obtain a job in technology education. Due to the various number of school district opportunities available, teachers must be familiar with the operation and maintaining of a wide variety of equipment found in Wisconsin's school districts technology education laboratories.

How do we train teachers to maintain such a wide variety of equipment? When conducting this research the University of Wisconsin-Stout, University of Wisconsin-Platteville, Bemidji State University, St. Cloud University were asked if they train

technology education teachers, and if the university had ever offered courses in machinery maintenance?

Up until the1980's, the University of Wisconsin-Stout is the only university that offered any courses in technology education machine maintenance. The University of Wisconsin-Stout is the oldest and has the largest number of graduates in technology education. Founded in 1919, Bemidji State University of Minnesota state college's philosophy is "no child left behind, it is a new era in education." Bemidji State University has never offered a course in machine maintenance. St. Cloud State University has been teaching technology education for eighteen years and has never had a course in machine maintenance Tony Schaller (2003). The University of Wisconsin-Platteville, founded in 1928, has never offered a course in machine maintenance Frank Steck (2003). Recertified to teach technology education in 1989, Frank Steck stated that the University of Wisconsin-Platteville has started developing a program in machine maintenance. Students concerns and liabilities are the reasons for the University of Wisconsin Platteville to be concerned with developing a technology education maintenance course. The university also feels that courses in equipment maintenance are mandatory in teacher preparation.

With the field of technology education becoming more and more complex, the equipment found in middle school and high school laboratories cannot be predicted. Teachers need to be trained on the operation and maintaining of several different types of equipment to ensure that they will provide a safe and functional classroom environment for students to learn.

Chapter III

Methodology

Method

This was a descriptive study of technology education teachers. The survey was used, to identify how technology education teachers are being trained to maintain the wide variety of equipment found in middle school and high school technology education departments.

Subject

The sample in this study, were seventy randomly selected technology education teachers from the Wisconsin Technical Education Association (WTEA) convention, April 3, 2003. The technology education teachers will be attending the WTEA or Wisconsin Technical Education Association convention April 3, 2003, at Chula Vista Resort, Wisconsin Dells. A minimum sampling size of seventy technology education teachers was required to generalize results in order to apply to the entire population of one thousand two hundred and fifteen technology education teachers in Wisconsin. Teachers were asked to voluntarily take a survey and return it to a table. The length of the survey was evaluated to ensure that teachers would be done taking the survey in five minutes. To encourage response rate, a one-dollar bill was given to each teacher returning the survey. A ninety percent return rate to eliminate survey bias.

Instrumentation

The instrument used in this study was a survey (Appendix E). Survey items were developed to answer the question, how are technology education teachers being trained to maintain the wide variety of equipment found in today's technology education laboratories.

Survey Procedure

1. Identify information needed for study, review objectives of study.
2. Write sample questionnaire and review.
3. Review and revise second questionnaire.
4. On line Human subjects training and get review board approval.
5. Survey seventy randomly selected teachers at WTEA convention.
6. Analyze results
7. Summarize results and conclusion.

Question Validation

- Questions were asked to determine proportion of male and female technology education teachers and the number of years of service each teacher has.
- The question of, "Are you a UW-Stout graduate?" was asked to determine actual percent of UW-Stout graduates teaching technical education.
- The question, "Do you feel it important to be well educated on shop maintenance?" helps show that teachers feel it is important to be well educated. Likert questions were used to weigh responses.

- The study will determine if teachers feel it necessary for universities to provide maintenance training.
- The questions relating to taking more than five shop classes identifies that teachers feel that it is important to be knowledgeable on operation of equipment used in technology education laboratories.
- The question of would you take a maintenance course if offered at a university, helps determine if teachers were offered courses in maintenance, would teachers be willing to take the course?

Statistical Method

Inferential statistics, relationship-correlation, demographics and research hypothesis were used to analyze surveys. Also cross tabulation (frequency counts and percentages with chi square analysis), percentages, mean, standard deviation, and test for equality of means will be used.

Data Analysis

Results from the surveys were each put on to a work sheet and those results from all of the surveys was given to Christine Ness Research and Statistical Consultant at the University of Wisconsin Stout. Christine took the results and statistically compared each question to the sample group. The results will be used to statistically prove that there is a significant difference in opinion of teachers with less than five years teaching experience and teachers with more than five years teaching experience, in maintenance comfort level, the need to be well educated in maintenance, the need to take more than five laboratory classes in teacher preparation, and the need for universities to provide maintenance training.

Chapter IV

Summary of Results

The study indicated that in 2003, technical education was taught by a majority of male teachers. Survey results from the April 2003 WTEA convention shows that over 90% (Table 1) of teachers at the convention were male with almost 50% (Table 2) of teachers having 10 or more years teaching experience.

Universities that teach technical education include University of Wisconsin-Stout, University of Wisconsin-Platteville, St. Cloud State University, Bemidji State University and Viterbo University. Many of these schools offer technical education as a major, but the majority or 78% (Table 4) of participants at the WTEA convention were University of Wisconsin-Stout graduates.

How did teachers that attended the 2003 WTEA convention learn to maintain technology education equipment? With over 87% (Table 7) of teachers saying that they are required to maintain the equipment found in their technology education laboratory, and only 26% (Table 6) of these teachers ever taking a maintenance course at a university; 70% (Table 9) of all teachers felt they were maintaining technology education equipment by trial and error. Not all teachers felt this was the proper way to learn to maintain equipment, and 20% (Table 17) of all teachers did not feel confident with their maintenance ability.

With over 98% (Table 5) of all teachers surveyed saying that it is very important to be well educated in equipment maintenance, 90% (Table 8) of the teachers felt very strongly that universities such as University of Wisconsin-Stout should provide courses intended to teach technology education equipment maintenance. Seventy percent of

surveyed teachers said that they would take a course in technology education maintenance if offered at a university.

Ninety percent (Table 11) of surveyed teachers felt that it was necessary to take more than five shop or laboratory classes to ensure that teachers have the skills training needed to safely teach technical education. These hands on experiences indirectly helped teachers understand the equipment that is used in technology education laboratories

Rate of Response

Samples were given to seventy technical education teachers at the WETA convention, Chula Vista Resort, Wisconsin Dells, April 3, 2003. Sixty of the seventy surveys were returned to the surveyor giving an eighty five percent return rate.

Demographics

Respondents were asked to indicate several demographics in the questionnaire, gender and if a teacher was a UW Stout graduate. Ninety percent of the teachers were male and 78% (Table 4) of respondents were Stout graduates.

Tables

Question number 1. **Male or Female?**

By looking at table1, gender response, 96.7 percent of the teachers at the WTEA convention were male. If calculated to the number of Wisconsin's teachers gender ratio forty-one female teachers and one thousand one hundred seventy-four male teachers.

Table 1:Male or Female

	FREQUENCY	Percent	Valid Percent	Cumulative Percent
Valid 1male	58	96.7	96.7	96.7
2 female	2	3.3	3.3	100.0
Total	60	100.0	100.0	

Question number 2. **How long have you been teaching Technology Education?**

Evaluating table2, almost half of all the teachers surveyed have less than ten years teaching experience, with the largest percentage of teachers teaching less than five years. As the population of technology education teacher ages and retires in the next five years it can be predicted that the percentage of teachers with less than five years teaching experience will continue to rise

Table 2: How long have you been teaching Technology Education?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 00-05 years	26	43.3	44.8	44.8
2 06-10 years	7	11.7	12.1	56.9
3 11-15 years	5	8.3	8.6	65.5
4 16-20 YEARS	6	10.0	10.3	75.9
5 21-years or longer	14	23.3	24.1	100.0
Total	58	96.7	100.0	
Missing 0	2	3.3		
Total	60	100.0		

Question number 3. **How many teachers teach technical education at your school?**

By looking at table 3, we can tell that over seventy percent of schools have three or more technology education teachers.

Table 3: How many teachers teach technical education at your school?

	FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
1 teacher	8	14.8%	14.8%	14.8%
2 teachers	7	13.0%	13.0%	27.8%
3 teachers	11	20.4%	20.4%	48.2%
4 teacher	7	13.0%	13.0%	61.2%
5 teachers	12	22.2%	22.2%	83.4%
6 or more teachers	9	16.7%	16.7%	100%

Question number 4. **Are you a UW -Stout graduate?**

Summarizing the survey results of table 4, seventy-eight percent of technology education teachers are University of Wisconsin-Stout graduates. Calculating this to the entire Wisconsin technology education population equals nine hundred and forty-seven UW-Stout graduates and two hundred and sixty-eight teachers from other universities.

Table 4: Are you a UW -Stout graduate?

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid 1 yes	46	76.7	78.0	78.0
2 no	13	21.7	22.0	100.0
Total	59	98.3	100.0	
Missing 0 no answer	1	1.7		
Total	60	100.0		

Question number 5. **Do you feel it is important to be well educated on shop maintenance?**

From looking at the results of table5, of the survey, 98.3 percent of technology education teachers feel that it is important to be well educated in maintenance. It does not matter if the teachers have more or less than five years teaching experience.

Table 5: Do you feel it is important to be well educated on shop maintenance?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 yes	59	98.3	98.3	98.3
2 no	1	1.7	1.7	1.7
Total	60	100.0	100.0	100.0

Question number 6**. Did you take a maintenance course at a university?**

Evaluating the survey results from table 6, we can see that twenty-seven percent of the technology education teachers surveyed took a maintenance course at a university. With seventy-eight percent of teachers graduating from the University of Wisconsin Stout and Stout offering a course in maintenance until 1983, some of the teachers with over twenty years teaching experience have a much greater chance of having taken a maintenance course in their university training.

Table 6: Did you take a maintenance course at a university?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 yes	16	26.7	26.7	26.7
2 no	44	73.3	73.3	100.0
Total	60	100.0	100.0	

Question number 7. **Do you maintain your shop equipment (maintain, lubricate, change blades, adjust equipment, fix broken equipment)?**

The research results for table7: eighty-six percent of technology education teachers maintain their technology education equipment.

Table 7:Do you maintain your shop equipment?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 yes	52	86.7	88.1	88.1
2 no	7	11.7	11.9	100.0
Total	59	98.3	100.0	
Missing 0 no answer	1	1.7		
Total	60	100.0		

Question number 8**. I believe it is important for universities to provide maintenance training.**

Summarizing the research results for table 8, over ninety percent of teachers feel that universities should provide technology education maintenance training.

Table 8: I believe it is important for universities to provide maintenance training?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 strongly disagree	1	1.7	1.7	1.7
	3 neutral	2	3.3	3.3	5.0
	4 agree	17	28.3	28.3	33.3
	5 strongly agree	40	66.7	66.7	100.0
	Total	60	100.0	100.0	

Question number 9. **Without proper training I have been forced to maintain equipment by trial and error?**

Evaluating the survey results from table 9, over seventy percent of teachers feel they are maintaining technology education equipment by trial and error. Calculated to the entire population of technology education teachers shows us that eight hundred and fifty of the one thousand two hundred and fifteen technology education teachers are maintaining equipment by trial and error.

Table 9: Without proper training I have been forced to maintain equipment by trial and error?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 strongly disagree	3	5.0	5.3	5.3
	2 disagree	4	6.7	7.0	12.3
	3 neutral	8	13.3	14.0	26.3
	4 agree	24	40.0	42.1	68.4
	5 strongly agree	18	30.0	31.6	100.0
	Total	57	95.0	100.0	
Missing	0 no answer	3	5.0		
Total		60	100.0		

Question number 10. **I feel confident on my maintenance ability?**

The survey results from table 10: twenty percent of technology education teachers do not feel confident about their maintenance ability. Calculated to the entire population

two hundred and forty-three teachers out of one thousand two hundred and fifteen are not confident about their maintenance ability.

Table 10:I feel confident on my maintenance ability?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2 disagree	1	1.7	1.7	1.7
	3 neutral	11	18.3	18.6	20.3
	4 agree	34	56.7	57.6	78.0
	5 strongly agree	13	21.7	22.0	100.0
	Total	59	98.3	100.0	
Missing	0 no answer	1	1.7		
Total		60	100.0		

Question number 11. **I should have been required to take more shop classes as part of my university training?**

Interpreting the survey results from table 11, over eighty percent of the technology education teachers feel that it is important to have five shop or laboratory classes to ensure that they receive the hands on experiences associated with the field of technology education.

Table 11: I should have been required to take more shop classes as part of my university training?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 strongly disagree	3	5.0	5.3	5.3
	2 disagree	2	3.3	3.5	8.8
	3 neutral	4	6.7	7.0	15.8
	4 agree	21	35.0	36.8	52.6
	5 strongly agree	27	45.0	47.4	100.0
	Total	57	95.0	100.0	
Missing	0 no answer	3	5.0		
Total		60	100.0		

Question number 12. **I would take a maintenance course if offered at a university?**

Evaluating the survey results for table12, almost seventy percent of teachers would take a maintenance course if offered at a university. Some of the teachers that responded neutral or disagree have already taken a maintenance course at a university.

Table 12: I would take a maintenance course if offered at a university?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 strongly disagree	4	6.7	6.9	6.9
2 disagree	1	1.7	1.7	8.6
3 neutral	12	20.0	20.7	29.3
4 agree	16	26.7	27.6	56.9
5 strongly agree	25	41.7	43.1	100.0
Total	58	96.7	100.0	
Missing 0 no answer	2	3.3		
Total	60	100.0		

Question number 13. **Teachers should be required to take more that five shop classes in there training?**

The survey results from table13, we see that over seventy percent of teachers feel it is necessary to take more than five shop classes. These classes indirectly help students learn about how machines work in technology education laboratories.

Table 13: Teachers should be required to take more that five shop classes in there training?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 strongly disagree	1	1.7	8	1.8
2 disagree	2	3.3	3.5	5.3
3 neutral	3	5.0	5.3	10.
4 agree	17	28.3	29.8	40.4
5 strongly agree	34	56.7	59.6	100.0
Total	57	95.0	100.0	
Missing 0 no answer	3	5.0		
Total	60	100.0		

Question number14. **Universities that train technology education teachers, should provide them maintenance training?**

Survey result observations from table 14; ninety-six percent of teachers feel that universities should provide technology education maintenance training.

Table 14: Universities that train technology education teachers, should provide them maintenance training?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 strongly disagree	1	1.7	1.7	1.7
3 neutral	1	1.7	1.7	3.3
4 agree	23	38.3	38.3	41.7
5 strongly agree	35	58.3	58.3	100.0
Total	60	100.0	100.0	

Question number 15. **On the job experience has increased my ability to properly maintain technology education lab equipment?**

Summarizing the survey results from table15, ninety-eight percent of teachers feel that their maintenance ability has been increased by on the job experiences.

Table 15: On the job experience has increased my ability to properly maintain technology education lab equipment?

	Frequency	Percent	Valid Percent	Cumulative Percent
	3	5.0	5.1	5.1
Valid 3 neutral	15	25.0	25.4	30.5
4 agree	41	68.3	69.5	100.0
5 strongly agree	59	98.3	100.0	
Total	1	1.7		
Missing 0 no answer	60	100.0		
Total				

Question number 16. **The number of technology education lab classes that I have taken has helped me be prepared to maintain equipment?**

By looking at the survey results for question number 16, almost fifty percent of the surveyed teachers feel, that the experiences that they get from taking laboratory classes helps them be prepared to maintain equipment.

Table 16: The number of technology education lab classes that I have taken has helped me be prepared to maintain equipment?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid1stronglydisagree	5	8.3	8.5	8.5
2disagree	12	20.0	20.3	28.8
3 neutral	14	23.3	23.7	52.5
4 agree	16	26.7	27.1	79.7
5 strongly agree	12	20.0	20.3	100.0
Total	59	98.3	100.0	
Missing 0 no answer	1	1.7		
	60	100.0		

Question number 17. **I feel comfortable in maintaining technology education equipment?**

Evaluating the survey results from table 17, twenty percent of teachers do not feel confident maintaining technology education equipment. This equates to over 200 technology education teachers in Wisconsin not feeling confident on maintenance ability.

Table 17: I feel comfortable in maintaining technology education equipment?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 2 disagree	4	6.7	6.8	6.8
3 neutral	8	13.3	13.6	20.3
4 agree	31	51.7	52.5	72.9
5 strongly agree	16	26.7	27.1	100.0
Total	59	98.3	100.0	
Missing0 no answer	1	1.7		
Total	60	100.0		

Null Hypothesis

1. There is no significant difference among opinions of teachers with less than five years teaching experience and teachers with over five years teaching experience, requiring universities to provide training in technology education shop maintenance.

To answer this question the results of table 2 were compared to table 8. The results of the survey, 98.3 percent of all teachers feel it is important to be well educated in maintenance. From the group statistics teachers that had more than six years teaching experience felt more strongly about universities providing equipment maintenance training. The null hypothesis has been disproved because there is a significant difference between teachers with less than five years teaching experience and teachers with less than five years experience requiring universities to provide maintenance training. In the group statistics the mean for teachers with less than five years teaching experience was 4.27, and teachers with more than five years teaching experience was 4.84, the teachers with more than five years teaching experience felt stronger about universities providing maintenance training.

Table 18: Group Statistics Comparing Table 2 to Table 8

YRS_EXP YEARS EXPERIENCE TEACHING TECHNOLOGY EDUCATION		N	Mean	Std. Deviation	Std. Error Mean
ITEM08 IMPORTANT FOR UNIV TO PROVIDE MAINRWNANCE TRAINING	**1 5 years or less**	26	4.27	.92	.18
	2 6 years or more	32	4.84	.37	6.52 E-02

Table 19: Levene's Test For Equality of Variances Table 2 to 8

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	12.024	.001	-3.235	56	.002	-.57	.18	-.93	-.22
				31.538	.01.005	-.57	.19	-.97	-.18
Equal variances not assumed			-2.997						

2. There is no significant difference on confidence ability of teachers with less than five years teaching experience and those teachers with over five years teaching experience.

To answer this question results from table 10 will be compared to table 2. By comparing the results, by Independent sample test and the Levine's test for equality of variance. The null hypothesis was not disproved to a 95%variance level, although 20% of teachers did not feel comfortable maintaining equipment some teachers with more than five years experience also find maintaining equipment difficult.

Table 20: Levene's Comparing Table 2 to Table 10

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal	.15	.69	-	55	.263	-.21	.18	-.57	-.16

variances assumed			1.13						
Equal variances not assumed			-1.1	53.7	.257	-.21	.18	-.56	-.15

3. There is no significant difference between teachers with less than five years teaching experience and teachers with more than five years teaching experience having had a maintenance course at a university.

By looking tables 2 and 6 we can see that the null hypothesis has been disproved there is a significant difference between teachers with less than five years teaching experience and teachers with more than five years teaching experience. Teachers with more than fifteen years teaching experience have a much greater chance of haven taken a maintenance course in their teacher preparation. The confidence level is at greater than 95%.

Table 21: Comparing Table 2 to Table 6

			ITEM06 DID YOU TAKE A MAINTENANCE COURSE AT UNIVERSITY		**TOTAL**
			1 yes	**2 no**	
YRS_EXP YEARS EXPERIENCE TEACHING TECHNOLOGY EDUCATION	**1 5 years or less**	**Count**	1	25	26
		Expected Count	7.2	18.8	26.0
		% Within YRS_EXP YEARS EXPERIENCE TEACHING TECHNOLOGY EDUCATION	3.8%	96.2%	100.0%
	2 6 years or more	**Count**	15	17	32
		Expected Count	18.8	23.2	32.0
		% Within YRS_EXP YEARS EXPERIENCE TEACHING TECHNOLOGY EDUCATION	46.9%	53.1%	100.0%

Total	**Count**	16	42	58
	Expected Count	16.0	42.0	58.0
	% Within YRS_EXP YEARS EXPERIENCE TEACHING TECHNOLOGY EDUCATION	27.6%	72.4%	100.0%

Table 22: Pearson Chi Square Analyses of Table 2 to Table 6

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	13.295	1	.000		
Continuity Correction	11.029	1	.001		
Likelihood Ration	15.611	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	13.66	1	.000		
N of Valid Classes	58				

4. There is no significant difference between teachers with less than five years teaching experience and teachers with more than five years teaching experience being required to maintain technology education equipment.

The null hypothesis was not proven to a ninety five percent confidence level. By looking at table 2 and table 7 we can see that over 85% of all teachers are required to maintain the equipment found in their labs.

Table 23: Cross Tabulation Comparing Table 2 and Table 7

Cross tab			ITEM07 DO YOU MAINTAIN YOUR SHOP EQUIPMENT		Total
			1 yes	2 no	
YRS_EXP YEARS EXPERIENCE TEACHING TECHNOLOGY EDUCATION	1 5 years or less	Count	20	5	25
		Expected Count	21.9	3.1	25.0
		% Within YRS_EXP YEARS EXPERIENCE TEACHING TECHNOLOGY EDUCATION	80.0%	20.0%	100.0%
	2 6 years or more	Count	30	2	32
		Expected Count	28.1	3.9	32.0
		% Within YRS_EXP YEARS EXPERIENCE TEACHING TECHNOLOGY EDUCATION	93.8%	6.3%	100.0%
Total		Count	50	7	57
		Expected Count	50.0	7.0	57.0
		% Within YRS_EXP YEARS EXPERIENCE TEACHING TECHNOLOGY EDUCATION	87.7%	12.3%	100.0%

5. There is no significant difference between teachers with less than five years teaching experience and teachers with more than five years teaching experience, having to maintain technology education equipment by trial and error.

By comparing table 2 and table 9 we can see that the null hypothesis was not disproved because over 80% of all teachers have to maintain technology education equipment by trial and error. The 95% confidence level is at .59 for both groups. There are several teachers in both groups that are required to maintain equipment.

Table 24: Comparing Table 2 to Table 9

Levene's Test for Equality of Variances		t-test for Equality of Means						
							95% Confidence Interval of the Difference	
F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
.360	.551	-.066	53	.948	-.2.00E-02	.31	-.63	.59
		-.065	51.145	.948	-.2.00E-02	.31	-.63	.59

6. There is no significant difference between teachers with less than five years teaching experience and teachers with more than five years teaching experience requiring teachers to take more than five laboratory or shop classes.

Comparing table 2 and table 13 we can see that our null hypothesis has been disproved. Teachers that have more than five years teaching experience feel stronger about teachers having to take more than five shop classes to graduate in technology education. With the group statistics teachers with more than five years teaching experiences feel stronger about this statement than teachers with less than five years teaching experience. Teachers with more than five years teaching experience understand that having to take laboratory classes indirectly helps a person understand the equipment used in technology education laboratories.

Table 25: Comparing Table 2 to Table 13

Item 13 Teachers should be required to take 5+ shop courses	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
		Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	10.017	.003	-2.895	53	.005	-.62	.21	-1.04	-.19
Equal variances not assumed			-2.640	29.099	.0135	-.62	**.23**	-1.09	-.14

Table 26: Group Statistics Comparing Table 2 and Table 13

YRS_EXP YEARS EXPERIENCE TEACHING TECHNOLOGY EDUCATION	N	Mean	Std. Deviation	Std. Error Mean
1 5 years or less	24	4.13	1.08	.22
2 6 years or more	31	4.74	.44	7.99 E-02

Chapter V

Reflections

The results of this study reflect a ninety-five percent confidence level for the population of Wisconsin's one thousand two hundred fifteen technology education teachers. The study reveals 98.3 percent (Table 5) of teachers feel that it is very important to be well educated in maintaining technology education equipment. The study sought to identify how were technology education teachers taught to maintain the wide variety of equipment found in middle school and high school laboratories. The results show that only twenty six percent (table 6) of the respondents have ever taken a maintenance course at a university, however all teachers except one taking a maintenance course have had over five years teaching experience. Teachers with less than five years teaching experience had a much greater chance of not taking an equipment maintenance course. The survey showed that eighty-seven percent (Table 7) of teachers maintain the equipment found in their laboratories; of those teachers seventy percent (Table 9) of them feel they maintain technology education equipment by trial and error. The survey revealed enough information to warrant universities such as University of Wisconsin-Stout, Bemidji State University, St. Cloud State University and others to begin offering courses in technology education shop maintenance. One university, the University of Wisconsin-Platteville is in the process of developing a course in technology education shop maintenance Steck (2003). With concerns from practitioners and students having to cope with the lack of maintenance training, the directors at the University of Wisconsin – Platteville felt compelled to include technology education maintenance courses in teacher preparation.

Teachers at the WTEA convention had similar ideas about the skills training needed for teacher preparation. Over eighty percent (Table 11) of teachers felt it should be required to take at least five laboratory classes, to be certified in technology education. As Pastalozzi said " Man learns by action, have done with [mere] words' life shapes us and the life that shapes us is not a matter of words but action." Teachers need to take classes that give them hands on understanding similar to the experiences they will be facing when they start to teach.

Methodology Limitations

A list of all Wisconsin technology education teachers can be obtained through the Department of Public Instruction, Madison Wisconsin. The results of this survey could be more generalized to the entire population of technical education teachers if surveys were sent out to a random sample of teachers through out the state. In the survey a question should have been asked, if the teacher did take a maintenance course, did that course help when maintaining school laboratory equipment? Also there could have been a test to determine maintenance aptitude.

Teacher Comments

After teachers took the survey and turned it in, many of them were saying that they could not believe that universities did not require teachers to take more than five shop classes to graduate in technology education. They were concerned that the questionnaire had shop classes instead of laboratory classes. A few of the teachers indicated verbally they were scared to death of maintaining laboratory equipment because of the lack of maintenance experiences. Many of the teachers were displeased with the

technology education curriculum abandoning the skills based learning courses such as woodworking, metals and auto.

Recommendations

With over seventy percent of technology education teachers maintaining technology education equipment by trial and error, (Table 9) universities should consider that teachers could be held liable for maintenance mistakes that cause injury. The research reveals there are no universities that are training technology education teachers to maintain technology education equipment. The University of Wisconsin-Platteville is in the process of developing a course in technology education shop maintenance. The University of Wisconsin-Stout provided courses in maintenance during the Manual Arts and Industrial art eras. Students who graduated before 1984, were more likely to have had taken a technology education shop maintenance course. With over ninety-six percent (Table 1) of technology education teachers being male and thirty-three percent (Table 2) of them having more than twenty years of experience, most of them feel it necessary for universities to provide maintenance training.

Students who are enrolled in technical education and not comfortable with using machinery should take as many laboratory classes as they can, to make sure they have the hand skills and experiences similar to the environment they will be teaching in. By taking these laboratory courses, the experience will also indirectly provide maintenance experiences.

It is understood that universities cannot teach all students how to maintain every piece of equipment found in technical education laboratories. Universities should design courses intended to teach machine maintenance. The University of Wisconsin-Stout could change technology education curriculum to include a required block of course

intended to introduce students to machinery maintenance. There are short courses that could be set up to teach students about changing projector bulbs, replacing the hard drive on a computer module, making fixtures for a woodworking project, replacing drive belts on a robot arm, setting up a preventative maintenance program or several other topics. The University of Wisconsin–Stout could follow the direction that The University of Wisconsin-Platteville is going, in creating a maintenance program.

Dr. Armand Hofer talked about the need for universities or technical colleges to design short courses in shop maintenance. Dr. Hofer suggested it would be easier because of political ramifications for technical colleges to teach theses courses instead of changing university curriculum. School districts could help by encouraging and paying for teachers to attend classes designed to teach them how to maintain equipment. This researcher concurred with the idea of short courses, but based on these study results, believes it is still necessary to be taught at the university level as an integral part of teacher preparation.

Students that will become technology education teachers need to understand that most school districts are going to expect teachers to maintain the wide variety of equipment found in technology education labs. Students that are not comfortable around equipment should take as many laboratory or skills based learning classes as possible. This will increase machine confidence and reduce anxiety.

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Wisconsin Employment Page. 5/1/2003. http://gov.wi.state.cpp.job.comm. *Gale-Ettrick- Trempealeau school district.*

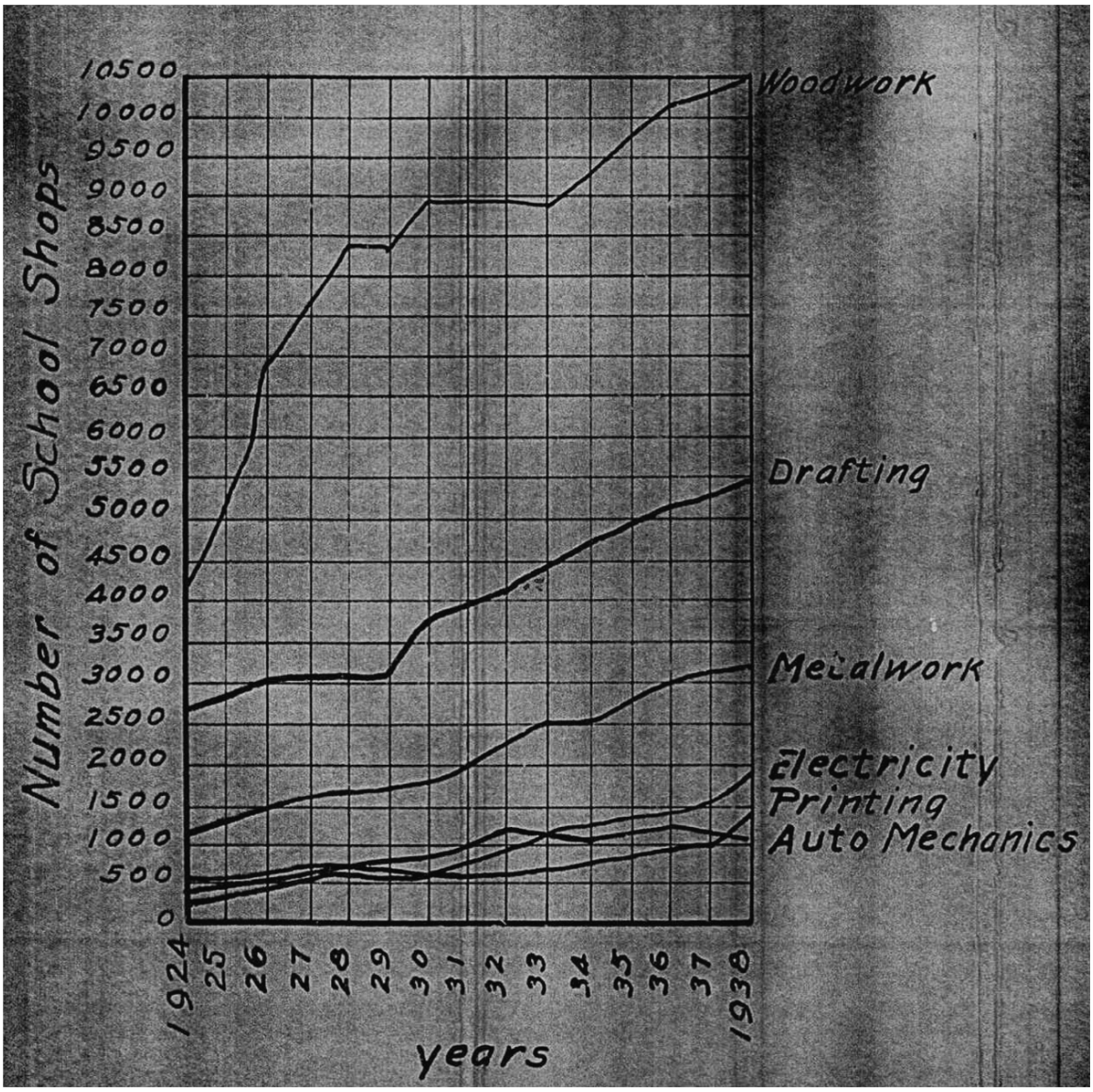
Wisconsin Employment Page. 5/1/2003. http://gov.wi.state.cpp.job.comm. *Hartford school district.*

Wisconsin Employment Page. 5/1/2003. http://gov.wi.state.cpp.job.comm. *Madison school district.*

Appendix:

APPENDIX A – 1940 Industrial Arts Shops

Title: Number and type of technology education shops in United States
Source: Ernest H. Hinz, Stout Institute, 1940



APPENDIX B – Employment Page 1

Title: Wisconsin Employment Opportunities
Source: Wisconsin Department of Instruction web page

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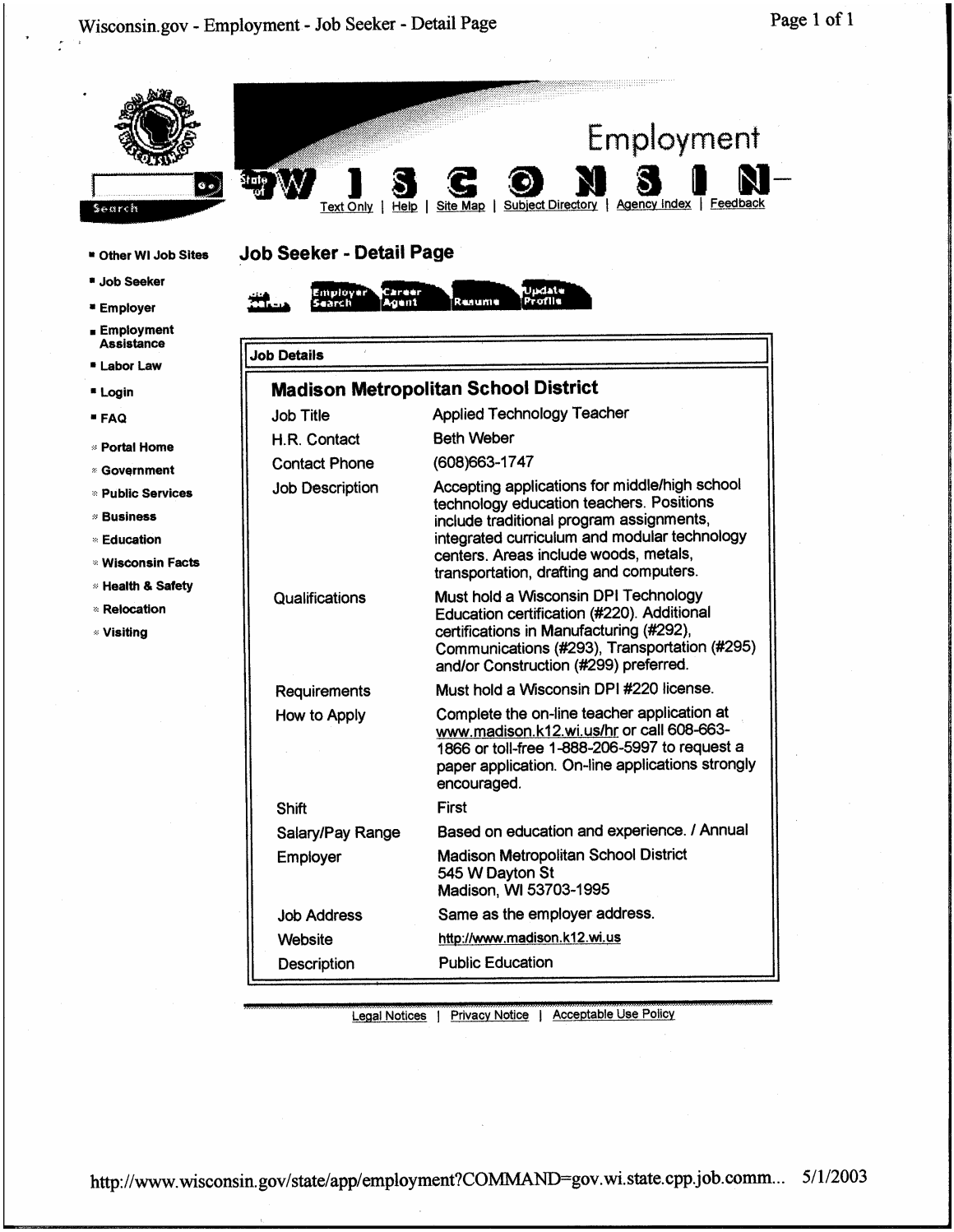
Job Details

Gale-Ettrick-Trempealeau School District

Job Title	High School Technology Education Teacher
H.R. Contact	Craig Gerlach
Contact Phone	(608)582-2291
Job Description	Full-time position for grades 9-12.
Qualifications	Auto Mechanics, Woods/Plastic Processes, Welding, Architectural Drafting, Tech Ed. I.
How to Apply	Extra-curricular/Co-curricular desired with position. Send cover letter, resume, complete set of credentials including recommendations, transcripts, etc., and a copy of DPI license to Craig S. Gerlach District Administrator, Gale-Ettrick-Trempealeau School District, 17511 N. Main Street, Galesville, WI 54630.
Employer	Gale-Ettrick-Trempealeau School District 17511 North Main Galesville, WI 54630
Job Address	Same as the employer address.
Website	http://getschools.k12.wi.us
Description	We are a rural school district of approximately 1460 students K-12. The high school is located in Galesville with a elementary school in each Trempealeau, Ettrick and Galesville. The Middle School is also located in Trempealeau. We employ around 210 people. We are located by the beautiful Mississippi River, 20 miles upriver from the city of La Crosse Wisconsin and 20 miles from Winona Minnesota.

APPENDIX C – Employment Page 2

Title: Wisconsin Employment Opportunities
Source: Wisconsin Department of Instruction web page.



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Job Details

Madison Metropolitan School District

Job Title	Applied Technology Teacher
H.R. Contact	Beth Weber
Contact Phone	(608)663-1747
Job Description	Accepting applications for middle/high school technology education teachers. Positions include traditional program assignments, integrated curriculum and modular technology centers. Areas include woods, metals, transportation, drafting and computers.
Qualifications	Must hold a Wisconsin DPI Technology Education certification (#220). Additional certifications in Manufacturing (#292), Communications (#293), Transportation (#295) and/or Construction (#299) preferred.
Requirements	Must hold a Wisconsin DPI #220 license.
How to Apply	Complete the on-line teacher application at www.madison.k12.wi.us/hr or call 608-663-1866 or toll-free 1-888-206-5997 to request a paper application. On-line applications strongly encouraged.
Shift	First
Salary/Pay Range	Based on education and experience. / Annual
Employer	Madison Metropolitan School District 545 W Dayton St Madison, WI 53703-1995
Job Address	Same as the employer address.
Website	http://www.madison.k12.wi.us
Description	Public Education

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http://www.wisconsin.gov/state/app/employment?COMMAND=gov.wi.state.cpp.job.comm... 5/1/2003

APPENDIX D – Employment Page 3

Title: Wisconsin Employment Opportunities
Source: Wisconsin Department of Instruction web page.

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Job Details

School District of Hartford Jt. No. 1

Job Title	Teacher - Technology Education
H.R. Contact	Vicki Ursprung
Contact Phone	(262)673-3155
Job Description	Technology Education (Industrial Arts) teaching position (Grades 6-8). Full time position to begin in August, 2003.
Qualifications	Experience working with middle level students preferred; middle school technology education certification (#220) and current Wisconsin teacher license required.
Requirements	Experience working with middle level students preferred; middle school technology education certification (#220) and current Wisconsin teacher license required.
How to Apply	Send letter of interest, resume, current university placement file and copy of teaching license to: District Administrator, School District of Hartford Jt. #1, 675 E Rossman Street, Hartford WI 53027. Deadline for receipt of applications is 5/2/03.
Employer	School District of Hartford Jt. No. 1 675 E. Rossman Street Hartford, WI 53027
Job Address	Same as the employer address.
Website	http://www.hartfordjt1.k12.wi.us
Description	The School District of Hartford Jt. No. 1 is a K-8 school district, located in southeastern Wisconsin. The district includes two elementary schools (K-5) and one middle school (6-8). The School District of Hartford Jt. #1 is an equal opportunity employer.

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APPENDIX E - SURVEY

Project Title: How are Technology Education teachers learning to maintain Technology shop equipment?
(Dave Shanklin) of (Technology Education) at the University of Wisconsin-Stout is conducting a research project titled, (How are Technology Education teachers learning to maintain Technology shop equipment?). We would appreciate your participation in this study.

It is not anticipated that this study will present any medical or social risk to you. The information gathered will be kept strictly confidential and any reports of the findings of this research will not contain your name or any other identifying information.

Your participation in this project is completely voluntary. If at any time you wish to stop participating in this research, you may do so, without coercion or prejudice. Just inform the researcher.

Once the study is completed, the analyzed finding would be available for your information.

Questions or concerns about the research study should be addressed to Dave Shanklin at (262)560-0853, or jerry Johnson at (715)232-1457. Questions about the rights of research subjects can be addressed to Sue Foxwell, Human Protections Administrator, UW-Stout Institutional Review Board for the protection of Human subjects in Research, 11 Harvey Hall, Menomonie, WI, 54751, phone (715) 232-112

Consent Form

I understand that my participation in this study is strictly voluntary and I may discontinue my participation at any time without prejudice.

I understand that the purpose of this study is to investigate the problem, How are Technology Education teacher being taught how to maintain Technology shop equipment? The only information collected will be the survey questions.

I further understand that any information about me that is collected during this study will be held in the strictest confidence and will not be part of my permanent record. I understand that in order for this research to be effective and valuable certain personal identifiers will be maintained throughout this study and that only the researchers will have access to the confidential information. I understand that at the conclusion of this study, all records which identify individual participants will be destroyed. I am aware that I have not and am not waiving any legal or human rights by agreeing to this participation.
"Benefit"—Participants will be given 1$ for their participation.

By signing below I verify that I am 18 years of age or older, in good mental and physical condition, and that I agree to and understand the conditions listed above.
Signature_____Date_____

Questionnaire

1. _____ male _____Female

2. How long have you been teaching Technology Education?

< 5years 6-10 years 11-15 years 16-20years

>20 years

3. How many teachers teach Technical Education at your school?

1 2 3 4 5 >6

4. Are you a UW-Stout Graduate?

Yes No

5. Do you feel it is important to be well educated on shop maintenance? Yes No

6. Did you take a maintenance course at a University ?

Yes No

7. Do you maintain your shop equipment (Maintain, lubricate, change blades, adjust equipment, fix broken equipment)?

Yes No

Rate these items as SA- strongly Agree, A-agree, N-not sure, D-disagree, SD-strongly disagree.

8. I believe it is important for Universities to provide maintenance training

SA A N D SD

9. Without proper training I have been forced to maintain equipment by trial and error?

SA A N D SD

10.I feel confident on my maintenance ability?

SA A N D SD

11.I should have been required to take more shop classes as part of my University training?

SA A N D SD

12.I would take a maintenance course if offered at a University?

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13.Teachers should be required to take more than 5 shop classes in there training?

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14.Universities that train Technology Education teachers, should provide them maintenance training?

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15.On the job experiences has increased my ability to properly maintain Technology Education lab equipment?

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16.The number of Technology Education lab classes that I have taken, has helped me be prepared to maintain equipment?

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17.I feel comfortable in maintaining Technology Education equipment?

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